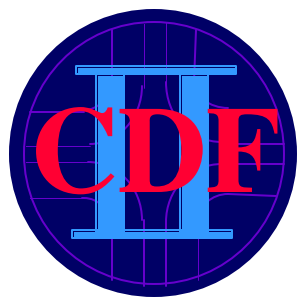




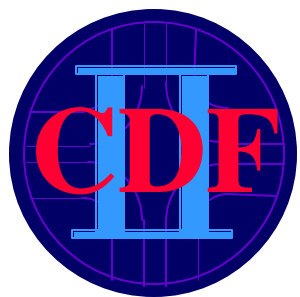
Overview of Level 2 Trigger

Myron Campbell



History

- 1992 – Replaced first generation Level 2 processors with Alpha based Processors. This was board replacement, all interface boards remained the same.
- 1993 – Changed DAQ design to use 4 buffers
- 1994 – Started work on building Run II boards



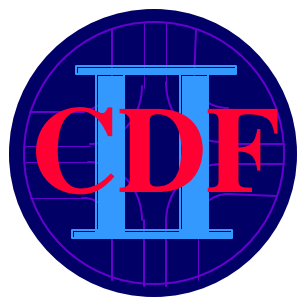
Run II Parameters (1995)

	Luminosity	Crossing Time	Interactions /crossing	Level 1 Rate	Level 2 Rate
Run IB	$20 \bullet 10^{30}$	3500 nsec	3.5	2.5 kHz	40 Hz
Run II	$50 \bullet 10^{30}$	396 nsec	1	12 kHz	250 Hz
Run II	$200 \bullet 10^{30}$	132 nsec	1.3	50 kHz	500 Hz



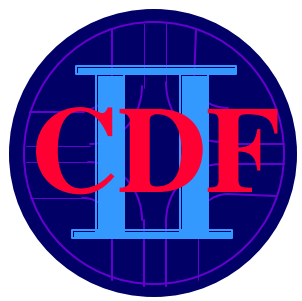
Design Parameters

- Trigger primitives for all systems formed simultaneously in parallel
 - Muon system uses TDC, mezzanine, custom cards
 - XFT system uses TDC, mezzanine, custom cards
 - SVX integrated with optical readout, custom cards
 - Calorimeter uses output from front end, Dirac, DCAS
- Data from all systems formatted into small number of words transmitted to level 2 processor



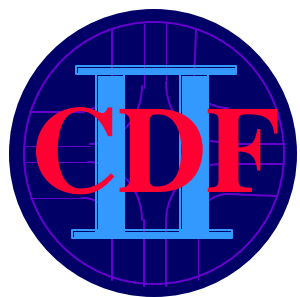
Collect data for decision

- All of the primitives for the event are generated in parallel.
- Optimize the format of the data for resolution, bandwidth, and rejection power.
- Load data into memory for event $N+1$ while analyzing data for event N .



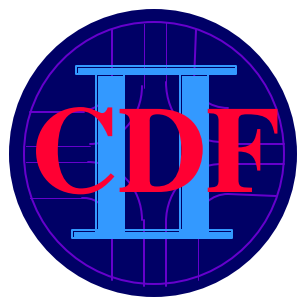
Design of Level 2 Processor

- First generation Alpha processor did not have cache or memory management – all built from ECL chips.
- For second generation decided to put all custom circuits in PCI slaves
 - Required prototype PCI slaves and detailed timing studies of the memory, first and second level cache.
 - This was done to provide an upgrade path where the processor was replaced while keeping the same interface design.



Run I Experience

- Once boards were working they were very reliable.
- Major sources of failures:
 - Connectors – if not gold plated.
 - Water damage
 - Handling



Maintenance

- Two tiered approach to maintaining the system
 - Keep spare boards available. When a board fails replace it. Requires test stands are available for the life of the experiment.
 - In the case of catastrophic failure and original parts obsolete (List Maker Multiplier in Run I) design new board with same inputs and outputs of the original.
- Minimize disruption to the operating detector.